

What is Claimed is:

1. An apparatus, comprising:
  - a cam 4200 having at least a first guiding surface 4202;
  - a cam following assembly 4220 including a first following surface 4228 for engaging the first guiding surface 4202 of the cam 4200 at least at a first contact point 4224, and a means for urging the first following surface 4228 against the first guiding surface 4202 of the cam 4200;
  - the first following surface 4228 defining a contact angle 4238 with the first guiding surface 4202 of the cam 4200; and
  - the first guiding surface 4102 of the cam 4100 being shaped such that the contact angle 4138 of the first follower 4122 changes substantially continually as the cam following assembly 4120 moves along a longitudinal axis 4148 of the cam 4100.
2. The apparatus of claim 1 wherein the first guiding surface 4102 of the cam 4100 has a substantially continually changing slope.
3. The apparatus of claim 1 wherein the first guiding surface 4102 of the cam 4100 has a substantially continually changing radius of curvature.
4. The apparatus of claim 1 wherein the contact angle 4238 is defined by a first imaginary line 4240 extending through the first contact point 4224 and a central axis 4244 of the first following surface 4228, and an imaginary reference line 4242.

5. The apparatus of claim 1 wherein the means for urging the first following surface 4228 against the first guiding surface 4202 of the cam 4200 comprises a spring 4232.

6. The apparatus of claim 5 wherein the spring 4232 comprises a leaf spring.

7. The apparatus of claim 5 wherein the spring 4232 comprises a coil spring.

8. The apparatus of claim 5 wherein the spring 4232 comprises a gas spring.

9. The apparatus of claim 5 wherein the spring 4232 comprises an elastomeric material.

10. The apparatus of claim 5 wherein the deflection of the spring 4232 varies in a manner substantially inversely proportionally to an associated variation in the trigonometric TAN function of the contact angle 4238 throughout a travel of the cam following assembly 4220.

11. The apparatus of claim 5 wherein the cam 4200 is shaped such that movement of the cam following assembly 4220 along the longitudinal axis 4248 of the cam 4200 causes a deflection of the spring 4232 and a change in the contact angle 4238 of the first following surface 4228 such that the magnitude of an axial force component 4252 of a reactionary force 4250 acting on the first following surface 4228 is substantially constant throughout a travel of the cam following assembly 4220.

12. An apparatus, comprising:

a cam 4100 having a first guiding surface 4102 and a second guiding surface 4104;

a cam following assembly 4120 including a first follower 4122 having a first following surface 4128 for engaging the first guiding surface 4102 of the cam 4100 at least at a first contact point 4124, a second follower 4126 having a second following surface 4130 engaging the second guiding surface 4104 of the cam 4100, and a spring 4132 having a first end 4134 coupled to the first follower 4122 and a second end 4136 coupled to the second follower 4126;

the first follower 4122 having a contact angle 4138 defined by a first imaginary line 4140 extending through the first contact point 4124 and a central axis 4144 of the first follower 4122, and an imaginary reference line 4142 extending between the central axis 4144 of the first follower 4122 and a central axis 4146 of the second follower 4126; and

the first guiding surface 4102 of the cam 4100 being shaped such that the contact angle 4138 of the first follower 4122 changes substantially continually as the cam following assembly 4120 moves along a longitudinal axis 4148 of the cam 4100.

13. The apparatus of claim 12 wherein the first guiding surface 4102 of the cam 4100 has a substantially continually changing slope.

14. The apparatus of claim 12 wherein the first guiding surface 4102 of the cam 4100 has a substantially continually changing radius of curvature.

15. The apparatus of claim 12 wherein the cam 4100 is shaped such that movement of the cam following assembly 4120 along the longitudinal axis 4148 of the cam 4100 causes a

deflection of the spring 4132 and a change in the contact angle 4138 of the first follower 4122 such that the magnitude of an axial force component 4152 of a reactionary force 4150 acting on the first follower 4122 is substantially constant throughout a travel of the cam following assembly 4120.

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16. The apparatus of claim 12 wherein the cam 4100 is shaped such that movement of the cam following assembly 4120 along the longitudinal axis 4148 of the cam 4100 causes a deflection of the spring 4132 and a change in the contact angle 4138 of the first follower 4122 such that the magnitude of an axial force component 4152 of a reactionary force 4150 acting on the first follower 4122 is substantially variable throughout a travel of the cam following assembly 4120.

17. The apparatus of claim 12 wherein the cam 4100 is shaped such that the deflection of the spring 4132 varies in a manner substantially inversely proportionally to an associated variation in the trigonometric TAN function of the contact angle 4138 throughout a travel of the cam following assembly 4120.

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18. The apparatus of claim 12, wherein the spring 4132 has a spring 4132 constant reflecting a substantially linear relationship between deflection and spring 4132 force.

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19. The apparatus of claim 12, wherein the spring 4132 has a spring 4132 function reflecting a substantially nonlinear relationship between deflection and spring 4132 force.

20. The apparatus of claim 12, wherein the cam 4100 is substantially symmetrical about the longitudinal axis 4148 thereof.

21. An apparatus, comprising:  
5 a cam 4300 having a first guiding surface 4302, a second guiding surface 4304, and a longitudinal axis 4348;

a cam following assembly 4320 including a first roller 4322 having a first following surface 4328 engaging the first guiding surface 4302 of the cam 4300 at least at a first contact point 4324, a second roller 4326 having a second following surface 4330 engaging the second guiding surface 4304 of the cam 4300, and a spring 4332 having a first end 4334 coupled to the first roller 4322 and a second end 4336 coupled to the second roller 4326;

the first roller 4322 having a contact angle 4338 defined by a first imaginary line 4340 extending through the first contact point 4324 and a central axis 4344 of the first roller 4322, and a imaginary reference line 4342 extending between the central axis 4344 of the first roller 4322 and a central axis 4346 of the second roller 4326;

the cam following assembly 4320 being moveable along the longitudinal axis 4348 between a first position 4368 and a second position 4370;

the spring 4332 having a first deflection when the cam following assembly 4320 is in the first position 4368 and a second deflection when the cam following assembly 4320 is in the second position 4370;

the first roller 4322 having a first contact angle 4338 when the cam following assembly 4320 is in the first position 4368 and a second contact angle 4358 when the cam following assembly 4320 is in the second position 4370; and

the first contact angle 4338 being different from the second contact angle 4358.

22. The apparatus of claim 21 wherein the first deflection is different from the second deflection.

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23. The apparatus of claim 22 wherein the second deflection is greater than the first deflection and the second contact angle 4358 is smaller than the first contact angle 4338.

24. The apparatus of claim 22 wherein the second deflection is greater than the first deflection and the trigonometric TAN function of the second contact angle 4358 is smaller than the trigonometric TAN function of the first contact angle 4338.

25. The apparatus of claim 24 wherein a first ratio of the first deflection to the second deflection is substantially equal to a second ratio of the trigonometric TAN function of the first contact angle 4338 to the trigonometric TAN function of the second contact angle 4358.

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